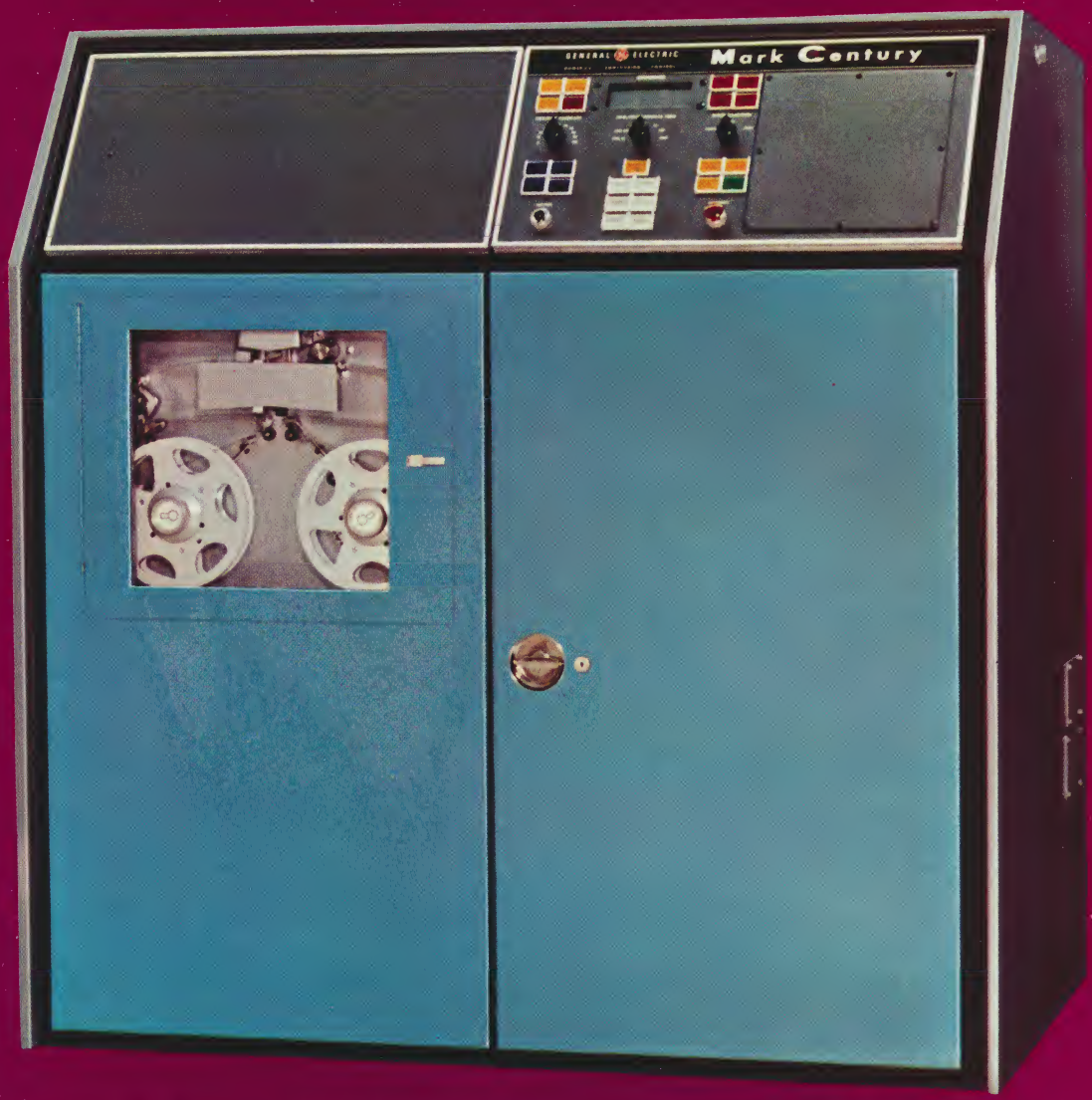


Mark Century* 100M

Numerical Contour Milling Control

A packaged Mark Century 3-motion numerical control
for continuous-path milling machines

*Trademark of General Electric Company

GENERAL ELECTRIC

Mark Century 100M

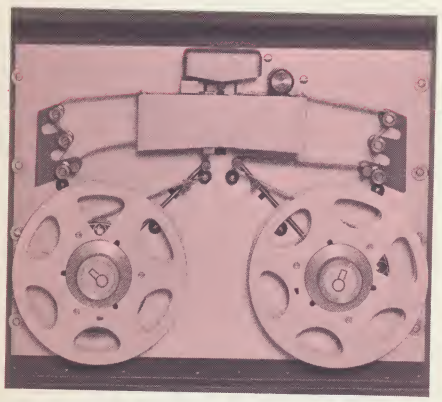
numerical contour milling control easily justified in any plant...

With the Mark Century 100M numercial control you get high performance contour milling at low cost—thanks to GE's unique concept, "packaged design."

Like other GE packaged models, the 100M control comes in one basic design with a choice of pre-engineered options for added flexibility. You save through product standardization and pay only for features you need.

What's more, all GE packaged numerical controls are similar in design and construction. This means operating costs drop where several types are in use because training and maintenance expenses are less and overall operating efficiency improves.

Besides the 100M control, GE has Mark Century packaged systems for turning, profile milling, boring, and point-to-point operations. They're available on a wide range of machines from a great number of machine builders.



High-speed photoelectric tape reader —500 characters per second—is an optional feature.

Highly reliable

The Mark Century 100M packaged control is built to the same high standards of design and construction as Mark Century custom controls. High reliability of the 100M control is the result of more than a decade of General Electric experience in supplying thousands of numerical control systems to over 100 machine tool manufacturers.

The Mark Century 100M numerical control is a digital system which takes full advantage of the fully proved reliability of transistorized printed circuits. Input data is entirely distributed, stored, and acted upon by solid-state circuitry.

Materials, fabrication methods, and components are used which meet rugged industrial requirements. For example, cabinet steel is heavy gauge, all wire connections are wrapped instead of soldered, and the latest design miniaturized operator devices are used. The enclosure is a NEMA 1 pressure ventilated, floor-mounted unit.

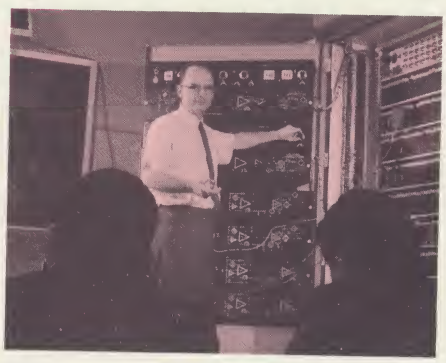
And, installation and start-up at your plant is quick and easy because the Mark Century 100M control is carefully matched to each builder's machine before it reaches you.

Total service

To help your personnel care for the Mark Century 100M control after installation and start-up, a two-week maintenance training school is conducted at the General Electric factory.

And this is just the beginning. General Electric provides the most complete service package in the industry today. Other services include:

- Automatic check tape for logic circuits
- Unmatched product warranties
- Local stocks of replacement parts
- Complete service and instruction manuals
- Printed circuit board exchange program
- Computer software support
- Local service engineers on call 24 hours a day for world-wide maintenance service.



GE training school educates your maintenance personnel in the care of your Mark Century 100M control.

for 3-motion continuous path milling

The Mark Century 100M contouring system can simultaneously control three machine motions, and is specially designed for machines doing contour milling on two- and three-dimensional shapes.

Convenience engineered

The 100M control is human engineered with switches and push buttons functionally arranged on a sloping panel across the top-front of the unit. Swing-open gasketed doors front, back, and top provide easy access to all parts of the unit. And interior walls are painted white for maximum visibility.

The logic-circuit portion of the control system is functionally arranged in modular panels of plug-in printed circuit boards. To make board changing easy and foolproof both the boards and rack slots are identified by function code.

The compact Mark Century 100M control measures only 52-inches wide, 32-inches deep, and 54-inches high.

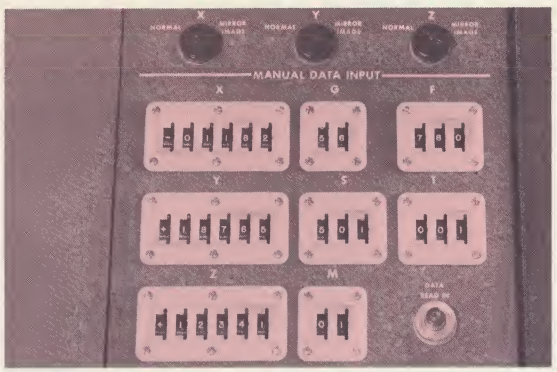
Simplified programming

To make programming and maintenance easier, the Mark Century 100M control has a binary-coded decimal format using standard EIA, 8-channel punched tape. The data are read by a photoelectric tape reader that operates at a speed of 300 characters per second. A 500 cps reader is available as an option. The control may also be operated by full manual data input or by jog push buttons for each motion.

To further simplify programming, postprocessors for APT and ADAPT computer programs are available.

The Mark Century 100M control has full 5-digit command capability, accepts incremental commands, has buffer storage, and is a linear interpolation system. Straight cuts and slopes up to 9.9999 inches can be programmed in each of three motions in the G01 mode. Dimensions up to 99.999 inches may be programmed with the G10 departure command.

Electrical resolution is ±0.0001 inch, with absolute control positioning accuracy of ±0.0004 inch, based on standard machine conditions.

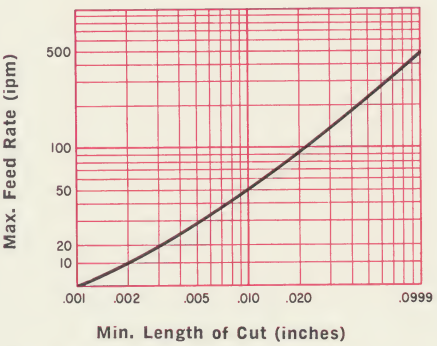


Full manual input capability using thumb-wheel switches is standard.

Unique milling capabilities

The Mark Century 100M is specifically a contour milling control system. The features you need are designed-in.

Full five digit command capability and long, normal, short, and extra-short block multipliers simplify programming and improve contouring performance. And, with the 100M control's extra-short block execution multipliers you can mill extremely short departures at high feed rates.



High feed rates for short departures with the Mark Century 100M control.

GE's outstanding electrohydraulic or SCR electronic servo systems offer you the industry's best performance. You get high accuracy, smoother finishes and minimum machine wear.

Your programmer does not have to worry about overshoot. Both inside and outside corners may be executed without programming deceleration or acceleration. GE's unique servo application does the work.

The GE double feedback system—both position and velocity loop—gives you the machine-control response needed for maximum milling efficiency.

Mark Century 100M
numerical contour milling control

Standard Features

High-speed Reader—A high-speed, 300-characters per second photoelectric tape reader is provided.

Full Manual Data Input—All data necessary for full machine operation can be input by thumbwheel switches. This is a valuable aid in set-up, initial program checkout, maintenance, and prototype work.

Incremental Feed Switch—For precise manual operation, movement of a selected increment from 0.0001 to 1.0 inch can be made by setting the selector switch for that increment and pressing the appropriate axis pushbutton.

Jogging Mode—Rapid manual movements can be made as needed for set-up and maintenance. Depressing one or more of the axis pushbuttons with the selector switch in **JOG** produces motion in either the plus or minus direction at a selected feedrate until the button is released.

Sequence Number Readout—This display identifies the tape command being acted upon by the machine, enabling the operator to search out any particular program sequence.

Miscellaneous Functions—As many as 100 miscellaneous commands may be utilized to control coolant flow and clutch circuits, to determine spindle direction and gear changing, and to permit more automatic control of the machining process.

Spindle Speed Selection—Up to 100 different spindle speeds may be programmed for maximum flexibility. "S" commands from 00 to 99 are available as needed.

Feedrate Override—For capability from 0 to 100 percent of programmed value, the operator can vary programmed feedrate at will by a Selector Switch.

Feedhold Push Button—A latching push button allows the operator to stop the control at any time without losing synchronization, even when the control is processing a block of information. The machine resumes normal operation when the button is depressed again.

Machine Mode Selector—The Mark Century 100M control can be operated in these modes:

Automatic—All machine commands come from programmed tape.

Semi-Automatic — Machine operated from commands entered by operator on the manual-data-input panel.

Manual—Operator may direct motions of machine by push button control of each axis.

Zero-position Push Buttons—Depressing these buttons for each axis sets all control counters to the zero dimension and causes the respective controlled motions to operate at top feedrate to their respective zero limit switches. At this point, the machine is synchronized and ready to start a contouring cycle.

Tape Parity Check—Reading error or parity check of each character read from the tape is provided. A tape error will stop all motions at the last command and illuminate a "reading error" light.

Sprocket Hole Verification—Proper alignment is also verified by a sprocket hole check circuit.

Parity Override—To allow for tape identification on the leader, the reader ignores everything prior to an end-of-block code.

Out of Synchronism Protection—Automatic acceleration limit circuit prevents the difference between commanded and actual positions from exceeding a predetermined amount.

Overtemperature Protection—This feature warns the operator of an overtemperature condition in the enclosure.

Rotary Resolver Feedback Unit—Precise correspondence of command signal and machine member is provided to a resolution of 0.0001 inch.

Servo Drives—Solid-state hydraulic servo systems are standard, providing highly reliable operation and maximum accuracy.

Control Checkout—The logic circuitry can be completely checked for proper operation by means of automatic check tapes.

Mirror Image—Axis inversion switches allow both right and left-hand parts to be produced from one tape by reversing the sign of the departures.

Optional features

Several optional features are provided for those applications requiring the special capabilities of each. They can be added easily with plug-in units and minor rewiring.

High-Speed Reader—For greater feedrate flexibility in programming short departures, a high-speed 500 character per second photoelectric tape reader is available with 8½ inch reels.

Full Floating Zero—Differential resolvers may be used to allow the programmer to establish his zero reference point at any desired location on the machine.

SCR Electronic Drives—Solid-state SCR (silicon-controlled rectifier) servo systems are available for greater flexibility.

Accupin* Linear Transducer—Direct measurement of the machine-tool position independent of lead screws or rack and pinion. Any mechanical inaccuracies in lead screws, gearing, and drive system are by-passed.

Third Digit "S"—A third digit of spindle speed capability may be added if needed.

Tool Selection—Either one, two, or three-digit "t" code provisions may be added.

*Trademark of General Electric Company

There is a Mark Century numerical control system to fit your needs, whatever your performance requirements. See your GE Sales Engineer, or machine-tool builder's representative for more information about General Electric numerical controls including the new Mark Century 100M control.

Specialty Control Department, Waynesboro, Virginia

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